Lecture 4

Theories of Decision Making

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PS4168: Economic Psychology

Overview

- Approaches to Studying Decision Making (revision)
- Defining Rationality (revision)
- Expected Value/Expected Utility Theory
  - Bayes Theorem
- Prospect Theory
- Social Functionalist Theory
- Dual-Process Theories
- Mental Models

Recap

Homo Economicus?

- a rational individual
- makes rational decisions
- that maximize utility
- is self-interested
- capable of learning from experience
- stable, consistent preferences (Ranyard, 2018, p. 6; see also Lea, Tarpy, & Webley, 1987; Wärneryd, 2008)

Approaches to Studying Decision Making

- Normative Theories *versus* Behavioural Theories
- Normative (prescriptive) approaches
  - Influenced by economic and mathematical models of how decisions ***should*** be made
  - Assume people are rational
    - should make the optimal choice (the choice that best reflects the person's preferences)
    - decisions should be consistent across settings
- Behavioural (descriptive) approaches
  - Describe how decisions are made

Defining Rationality

- Epistemic rationality
  - Rational belief or inference
  - Has a conclusion that is true
- Rationality of action
  - Actions (as opposed to beliefs/inferences)
  - Helps to achieve a goal
- **Instrumental rationality**
  - "our mental states or processes are rational when they help us to achieve our goals" (Over, 2004, p. 3)

Expected Value / Expected Utility Theory

Expected Value

- Which gamble would you rather play?
  - **A:** 20% chance of winning €5
  - **B:** 30% chance of winning €4
- Pick the option with the highest *Expected Value*
  - EV = probability of outcome x value of outcome
- EV(A) = 20% x €5 = €1
- EV(B) = 30% x €4 = €1.20
- **B has greater expected value**

Problem with Expected Value

- Not every Euro has the same subjective value
  - Low income: €100 would allow person to eat better food or buy new clothes
  - High income: €100 would not need to be spent on necessities
- Lotteries
  - Pay €1 for a 1/52,000,000 chance to win €10,000,000
    - Expected value of this gamble is less than €1

Expected Utility

- Utility = subjective value
  - represents whatever people want to achieve (Von Neuman & Morgenstern, 1947)
- EU = probability of outcome x utility of outcome
- Lotteries
  - Expected utility of €1 is low - not much you can do with €1
  - Expected utility of the prize is high - could do a lot with that kind of money
    - The low probability of winning does not completely outweigh the high utility of the prize
  - There is also the pleasure in dreaming about winning

Predictions of Expected Utility Theory

- Choices consistent across transformations
  - a: 45% chance of €200 vs b. 50% chance of €150
  - a: 90% chance of €200 vs b. 100% chance of €150
- Preferences stable across measures
  - Do you prefer A or B?
  - Would you pay more for A or B?

Bayes Theorem

$$p(y|x) = \frac{p(x|y)p(y)}{p(x)}$$

Prospect Theory

Prospect Theory

- Kahneman & Tversky (1979; 1974) suggested a more realistic approach to describing decision making.
- Prospect theory highlights the exaggerated weighting of expected losses in people's decision making.
- Decision weights instead of probabilities
  - Decision weights are generally slightly lower than probabilities.
    - Though this changes at low probabilities.

Prospect Theory

- Two people had paid a non-refundable deposit of €100 for a weekend at a resort.
  - On the way to the resort, both of them became slightly unwell, and felt they would probably have a more pleasurable time at home than at the resort.
  - Should they drive on or turn back?

Prospect Theory - Sunk Cost

- Prediction of *loss-aversion*
- The sunk-cost effect:
  - extra expenditure in order to avoid a loss.
- This can occur even when additional expenditure is now on a less preferred option.
  - examples?

Recall:

- Choices consistent across transformations
  - a: 45% chance of €200 vs b. 50% chance of €150
  - a: 90% chance of €200 vs b. 100% chance of €150

Prospect Theory - Risk Aversion

- *Sure* gains are chosen over *risky* but possibly greater gains.
  - This is termed **risk aversion**.
- ***BUT***

Prospect Theory

- Given the choice of either Option A or Option B below, which one would you go for?
  - a: A sure loss of €800
  - b: An 85% chance of losing €1000, with a 15% chance of losing nothing.

Prospect Theory - Risk Aversion/Seeking?

- Risk aversion can be transformed into risk seeking.
  - We are more likely to take a chance to avoid a loss than we are to make a gain.

Prospect Theory - Practical applications

- Banks et al. (1995) studied the effectiveness of two videotapes in persuading women to undergo a mammogram.
- Same medical facts presented on both tapes, but one emphasised gains of undergoing a test, the other the risks of not undergoing one.
- More of those who watched the risk-focused tape obtained a mammogram in the following 12 months.

Prospect Theory

(Kahneman & Tversky, 1979, p. 279)

Prospect Theory

(Kahneman & Tversky, 1979, p. 283)

Social Functionalist Theory

Social Functionalist Theory

- Tetlock (2002) suggests that we need a more socially aware model of the decision maker.
- Rather than an intuitive *economist* or intuitive *scientist* we might consider:
  - Intuitive politician
  - Intuitive prosecutor
  - Intuitive theologian

Booking a Holiday

- You have a chance to by a very cheap holiday to Italy, but you must today.
- You have just recently taken an exam, but you don't know yet whether you've passed or failed.
  - Buy the holiday.
  - Don't buy the holiday.
  - Pay €5 so you can still buy the holiday at the cheap price in two days time.

Booking a Holiday

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Intuitive Politicians

(making ourselves accountable)

- We are accountable to "a variety of constituencies".
- Sometimes we must be prepared to offer explanations to maintain relationships, or maintain others' perceptions of us.
- The presence of others and the resources for explanation can affect decision making.

Intuitive Prosecutors

- Certain contexts can trigger patterns of decision making that involve more punitive (or less lenient) actions.
- Tetlock et al. (2007) found that a situation where norms have been violated lead to a range of emotional and attributional effects on decision making.
- Strong interactions with conservative vs. liberal beliefs.

Intuitive theologians

- Being an intuitive theologian means acting as though decisions should flow from some higher authority.
- Strong ethical considerations can overwhelm base-rate information.
  - *moral outrage*

Activity

- In Groups:
  - Please Identify an example when you acted as
    - an intuitive politician
    - an intuitive prosecutor
    - an theologian:

Activity (link)

What are Dual-Processes?

- System 1 *versus* System 2 (Stanovich, 1999, 2005)
- intuitive / heuristic *versus* analytic (Chaiken, 1980; Evans, 1989, 2006, 2007)
- automatic *versus* controlled (Schneider & Shiffrin, 1977)
- experiential *versus* rational (Epstein, 1994; Epstein & Pacini, 1999; Pacini & Epstein, 1999)
- implicit / tacit *versus* explicit (Evans & Over, 2013; Reber, 1989)
- associative *versus* rule-based (Sloman, 1996; Smith & DeCoster, 2000)
- for reviews see Evans (2010); Evans (2008); and Kahneman (2011)
- Parallel / interventionist / competing / conflict ??

Features of Dual-processes

- Consciousness
- Evolution
- Functional
- Individual differences

- (Evans, 2008, p. 257)

Features of Dual-processes: Consciousness

Features of Dual-processes: Evolution

Features of Dual-processes: Functional

Features of Dual-processes: Individual differences

Dual Processes and Other Variables

- Cognitive Capacity
  - Individual differences (Barrett, Tugade, & Engle, 2004; Brünken, Steinbacher, Plass, & Leutner, 2002)
  - Manipulated/nature of task (De Neys & Schaeken, 2007; Trémolière, Gagnon, & Blanchette, 2016)
- Construal level and Distancing (Ayduk & Kross, 2010; Fujita, Henderson, Eng, Trope, & Liberman, 2006; Liberman, Sagristano, & Trope, 2002; van Dijke, van Houwelingen, De Cremer, & De Schutter, 2017)
- Need for Cognition
  - "to engage in and enjoy effortful analytic activity" (Cacioppo & Petty, 1982; Forsterlee & Ho, 1999, p. 471)

Dual-processes in Action

Influencing Decisions

- Cognitive Load Manipulations (Deck & Jahedi, 2015)
  - Increased load inhibits System 2
- Results
  - To more risk-averse behavior
  - More impatience over money
  - More susceptible to specific biases (anchoring effects)

Dual-processes in Action

Inhibiting Stereotypes

- Stereotypes lead to prejudices
  - Prejudices are inevitable (Devine, 1989)
- But not all stereotypes are *acceptable*
- System 1 perceives the stereotype
  - causing the prejudice
- System 2 attempts to inhibit the prejudice
- Stereotypes are automatically activated ***but*** personal beliefs require conscious activation

Dual-processes in Action

Inhibiting Stereotypes

3 Studies (Devine, 1989):

- Study 1:
  - Method:
    - Prejudice measured using the Modern Racism Scale (McConahay, Hardee, & Batts, 1981)
    - Knowledge of Stereotypes measured by open-ended *"list components of stereotype"*
  - Results:
    - No relationship between stereotype knowledge and level of prejudice

Dual-processes in Action

Inhibiting Stereotypes

- Study 2:
  - Method:
    - Prejudice measured using the Modern Racism Scale
    - Stereotypes primed using word lists
    - Judged ambiguous behaviours
  - Results:
    - Evaluation of ambiguous behaviours consistent with stereotype
    - No difference in stereotype activation for high vs low prejudice participants

Dual-processes in Action

Inhibiting Stereotypes

- Study 3:
  - Method:
    - Prejudice measured using the Modern Racism Scale
    - Participants reported *"all of their thoughts"* on the target group
  - Results:
    - Low prejudice responses were less consistent with stereotypes than high prejudice participants
    - People can (sometimes*) monitor and inhibit the influence of automatically activated stereotypes

Limitations of Dual-Process Theories

- Separable systems/processes? (e.g., Mugg, 2015)
- A continuum? (e.g., Alós-Ferrer & Strack, 2014)
- Exclusivity? Switching? (De Neys, 2023)
- How do they work together?

Mental Models

Mental Models

- Proposed by Philip Johnson-Laird (Johnson-Laird, 1983, 2006)
- "Mental models" are descriptions of how we represent information
- A "Mental Model" differs from a "Full model"
  - Incomplete
  - Laziness/cognitive ease

Mental Models

You are permitted to carry out only one of the following two actions:

Action 1: Take the apple or the orange, or both.

Action 2: Take the pear or the orange, or both.

Are you permitted to take the orange?

(Bucciarelli, Khemlani, & Johnson-Laird, 2008; Johnson-Laird, 2006)

Mental Models

Action 1	Action 2
Take the apple	Take the pear
Take the orange	Take the orange
Take both the apple and orange	Take both the pear and orange

Figure 1: mental_models

Mental Models

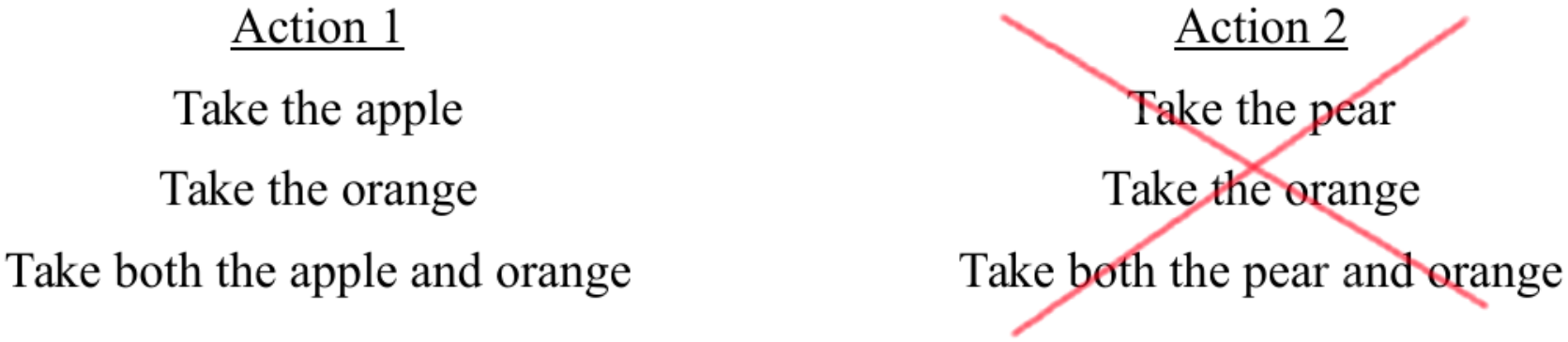


Figure 2: mental_models

Mental Models

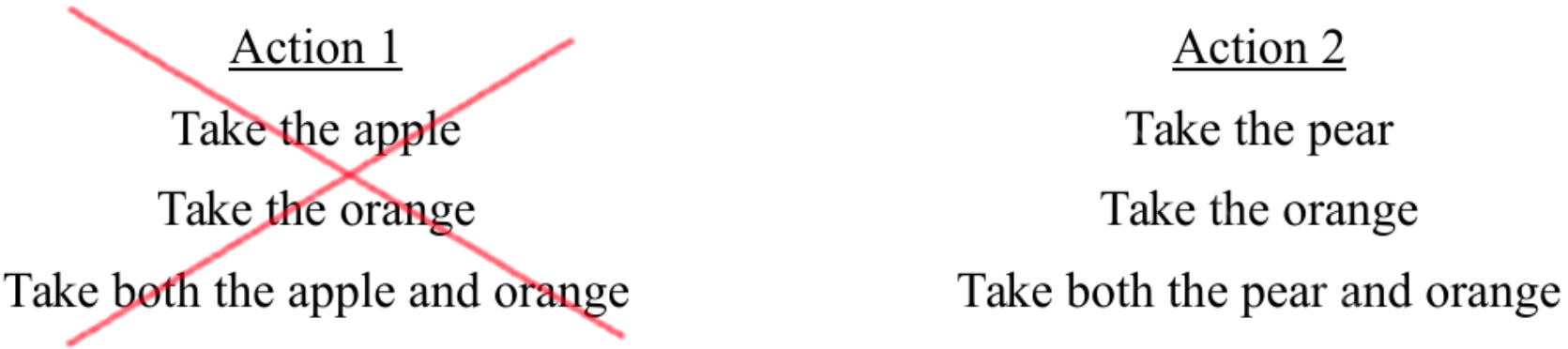


Figure 3: mental_models

Complete Models

Action 1	Action 2
Take the apple	~~Take the pear~~
(Take the orange)	~~Take the orange~~
Take both the apple (and orange)	~~Take both the pear and orange~~

Figure 4: mental_models

Complete Models

Action 1	Action 2
~~Take the apple~~	Take the pear
~~Take the orange~~	(Take the orange)
~~Take both the apple and orange~~	Take both the pear (and orange)

Figure 5: mental_models

Mental Models

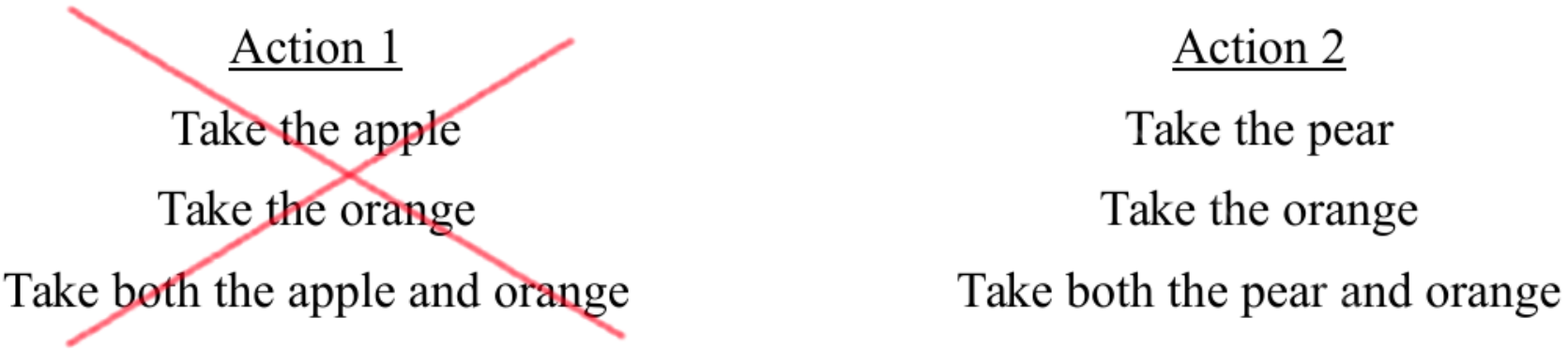


Figure 6: mental_models

Mental Models and Spatial Relations

- *the knife is on the right of the fork, and the napkin is on the left of the knife*

(Byrne, 2015)

Mental Models and Spatial Relations

- *the knife is on the right of the fork, and the napkin is on the left of the knife*

Napkin Fork Knife

Figure 7: mental_models

Mental Models and Incomplete Information

- *All of the napkins are blue*

Mental Models and Incomplete Information

- *All of the napkins are blue*

napkin blue

napkin blue

napkin blue

blue

Mental Models and Incomplete Information

- *if there's a lily in the vase then there's a rose*

Mental Models and Incomplete Information

- *if there's a lily in the vase then there's a rose*

lily rose

Figure 9: mental_models

Mental Models and Incomplete Information

- *if there's a lily in the vase then there's a rose*

lily

rose

. . .

Figure 10: mental_models

Mental Models and Alternative Possibilities

- *the knife is on the right of the fork, and the napkin is on the left of the knife*
- Is the fork is on the right of the napkin?

Mental Models and Alternative Possibilities

- *the knife is on the right of the fork, and the napkin is on the left of the knife*

Napkin	Fork	Knife
Fork	Napkin	Knife

Mental Models and Alternative Possibilities

- *the knife is on the right of the fork, and the napkin is on the left of the knife*
- Is the fork is on the right of the napkin?

Napkin Fork Knife

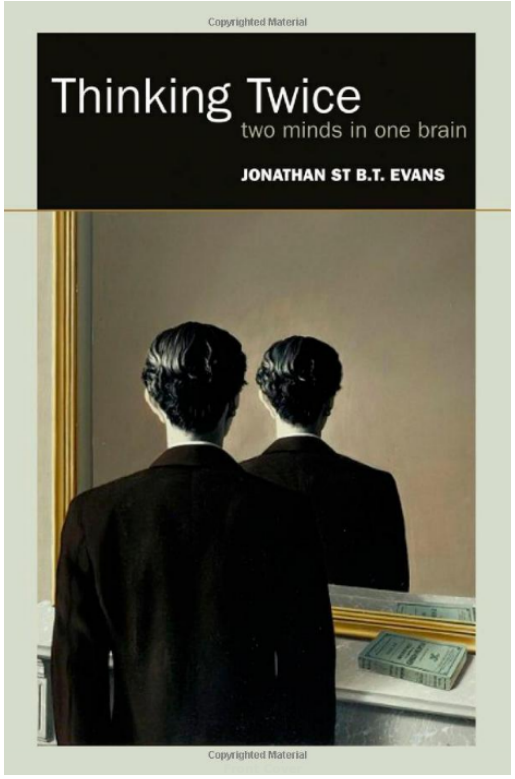
Fork Napkin Knife

Uses of Mental Models

- Counterfactuals (if)
- “Logical” conclusions
- Counter examples
- Everyday reasoning

- Mental model is “generated” by System 1 but System 2 “uses” it

Further Reading



(Evans, 2010)

Figure 11: mental_models

Activity

- In Groups:
  - Evaluate the theories of decision Making discussed
    - listing strengths and limitations of each

Activity (link)

References

References

Alós-Ferrer, C., & Strack, F. (2014). From dual processes to multiple selves: Implications for economic behavior. *Journal of Economic Psychology*, *41*, 1–11. https://doi.org/10.1016/j.joep.2013.12.005

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